

***Remarks***

Please consider the following remarks.

Claims 1-81 are currently pending in the application.

The Examiner is respectfully requested to reconsider and withdraw the rejection of claims 1, 7, 13-14, 16-20, 46-50, 67-71, and 74-81 under 35 U.S.C. 103 as being unpatentable over Wu (U.S. 5,268,127) in view of Peterson et al. (U.S. 5,284,990).

The Wu patent is directed to resolving problems associated with the corrosive nature of mixtures of HF and sulfolane that makes the storage of such mixtures in carbon steel process equipment commercially impractical. *See* column 1, line 52 through column 2, lines 19 and 32-43. Wu states that diluting HF with sulfolane reduces the fuming tendency of HF making the handling and storage of HF safer and, in the event of release, the HF will tend to remain in liquid solution. *See* column 1, line 65 through column 2, line 2. The Wu Example 2 states that “HF/sulfolane loading was accomplished at liquid nitrogen temperature through a pressure regulator.” *See* column 3, lines 56-57.

The containment pressure for a sulfolane and HF mixture of less than 30 psig, as claimed in the instant application, constitutes a patentable improvement over Wu.

The Peterson et al. patent teaches away from the Wu teachings by indicating that the only way to resolve safety problems associated with transportation of HF is to not use HF. Peterson states that “HF release mitigation equipment . . . cannot protect against HF release during unloading operations or from a rupture of

trucks or railroad cars loaded with HF during transportation of HF to the refinery.”

*See* column 1, lines 43-47. Peterson thus teaches that because the handling of HF is so dangerous and mitigation attempts are ineffective, the only solution to the dangers associated with handling HF is to replace HF with sulfuric acid. *See* column 1, lines 48-51.

Because the references neither individually nor in combination disclose each and every limitation of Applicants’ claimed invention, a *prima facie* case of obviousness of the claimed invention has not been made. The Wu patent discloses HF storage. The transportation of a closed volume containing a hydrogen fluoride and sulfone liquid mixture using a tank car or a tank truck, as claimed in the instant application, defines a patentable improvement over Wu. The use of closed volume tank cars and tank trucks for the bulk transfer of a liquid mixture of hydrogen fluoride and sulfone, as claimed in the instant application, constitutes a patentable improvement over Wu. Also, the maintenance of a vapor space within the tank car/tank truck closed volume containing the HF/sulfone mixture as claimed in the instant application, constitutes a patentable improvement over Wu. Furthermore, a vapor space pressure of “less than 30 psig”, as claimed in the instant application, constitutes a patentable improvement over Wu.

As for the Peterson patent, there is absolutely no teaching of the use of sulfone as an HF diluent. Actually, Peterson teaches that HF release mitigation is not effective. This suggests that the Wu and Peterson patents are not combinable except as it relates to improper hindsight; particularly, since, Peterson indicates that the only approach to addressing the hazards associated with HF handling is to not use it at all

(i.e., substitute sulfuric acid for HF). Even if the disclosures of Wu and Peterson were combined, not all of the recited limitations of Applicants' claims can be found in such combination. For instance, the vapor space requirement of the closed volume containing a liquid HF/sulfone mixture is not taught by either reference.

In any event, Applicants' invention allows for minimization of pressure within the closed volume containing a liquid HF/sulfone mixture. In the specification, Applicants indicated the desirability of minimizing the pressure of the closed volume for reducing the rate of release of its contents in the event of a leak. See specification at page 2, line 3 through page 3, line 2; page 4, line 19 through page 5, line 2; page 4, line 18 through page 6, line 2; and page 13, line 13 through page 14, line 2. However, to keep the contents in liquid form at standard atmospheric conditions, the vapor pressure of the liquid mixture must be lower than that of pure HF. The Peterson patent addresses none of these considerations.

It is thus noted that even if it is permissible to combine the Wu and Peterson patents, their combination does not disclose all the limitations recited in the claims; therefore, a prima facie case of obviousness has not been made.

Applicants assert, however, that the two references are not combinable but, in fact, teach away from each other. Peterson indicates that HF cannot be handled safely and that the only solution to this safety concern is to replace HF with sulfuric acid. Thus, Peterson is saying that the transportation of HF with tank cars or tank trucks should not be done at all. Peterson does not even remotely suggest the use of sulfone or sulfolane as an HF diluent. Finally, Peterson does not disclose any of the limitations of the claimed invention; except, that Peterson merely indicates that

trucks or railroad tank cars can transport HF. Peterson instead provides evidence of a long-felt need to have a safe method of transporting HF, a need provided for by the instant application.

In summary, the references should not be combinable; since, there is no suggestion in the Peterson patent that sulfolane can be used with HF. Rather, Peterson teaches that HF cannot be used safely and must be replaced. Peterson discloses none of the limitations of the claimed invention except that Peterson does state that tank cars and tank trucks can be used to transport HF. Even if the references are properly combinable, however, the combined disclosures fail to teach each and every limitation of the claimed invention. Additionally, Peterson provides evidence of a long-felt and unmet need for a safe method of transporting HF. Therefore, no prima facie case of obviousness has been made.

The Examiner is respectfully requested to reconsider and withdraw the rejection of claims 2-6, 8-12, 15, 21-45, and 51-66 under 35 U.S.C. 103 as being unpatentable over Wu, in view of Peterson et al. as applied to claims 1, 7, 13-14, 16-20, 46-50, 67-81 and further in view of Hutchinson (U.S. 3,488,920).

Applicants argue that the instant application is a patentable improvement over Wu, Peterson, and Hutchinson, either alone or in combination.

As stated above, the HF transport method as claimed in the instant application is a patentable improvement over Wu and Peterson provides evidence of a long-felt need of safely transporting HF.

Hutchinson discloses recovering hydrogen fluoride from tetrahydrothiophene 1,1-dioxide by applying heat. *See* Hutchinson, column 3, lines 22-24.

Applicants respectfully state that separating HF from sulfone at a destination point, after being transported there from an origin point, is a patentable improvement over Hutchinson.

There is also no motivation to combine the Wu, Peterson, and Hutchinson references. As stated above, Peterson indicates that HF cannot be handled safely, and that the only solution to this safety concern is to replace HF with sulfuric acid. There is no suggestion in Peterson to transport HF at all, whether alone or as a mixture. Therefore, there is no motivation to combine these references, apart from improper hindsight.

The Examiner is respectfully requested to reconsider and withdraw the rejection of claim 1-81 under 35 U.S.C. 103 as being unpatentable over Wu in view of JP 57-92,502 and Hutchinson.

JP 57-92,502 discloses reacting HF with pyridine to form a complex, and this complex can be stored or transported. *See* Constitution. The Examiner states “It would have been obvious to one of ordinary skill in the art at the time the invention was made to transport the mixture of HF and sulfolane as disclosed Wu ‘127 as suggested by JP ‘502 because JP ‘502 teaches that it is desirable to safely transport HF as well as to safely store HF”. *See* Office Action, page 8, second paragraph. Applicants respectfully disagree.

The Constitution of the JP '502 reference teaches reacting HF with pyridine to form a complex. It does not disclose mixing HF with a sulfone. There is no motivation to combine the Wu, Peterson, Hutchinson, and JP 57-92,502 references. There is no suggestion in Peterson to transport HF at all. Furthermore, transporting an HF/pyridine complex safely does not, in any way, make it obvious that an HF/sulfone mixture could be transported safely as well.

***Response to Response to Arguments***

Regarding the Wu reference, the Examiner states “that the final pressure inside the vessel does not have to be the same as the ‘loading’ pressure . . . one of ordinary skill in the art would have found it prima facie obvious to optimize the conditions within the tank car (or vessel) to maintain the HF/sulfolane mixture in the liquid state while minimizing the potential release of HF in the event of an accident” (*see* Final Office Action, p. 7, 7<sup>th</sup> paragraph to p. 8, 1<sup>st</sup> paragraph).

The Examiner is respectfully requested to examine the Example of the instant application. The Example states “HF can be contained at a lower pressure than HF alone due to vapor pressure effects of sulfolane” (*see* Application, p. 18).

The Examiner also states ‘it would have been obvious to one in the art to transport HF as a mixture of HF/sulfolane because Peterson recognizes the need of transport HF and the need to confine the HF . . .’ (*see* Final Office Action, p. 9, 3<sup>rd</sup> paragraph).

Once again, as stated above, Peterson teaches that the only solution to the dangers associated with handling HF is to not use HF at all. Applicants argue that the Peterson reference cannot be combined with Wu because it teaches not using HF.

The Examiner also states “it would have been prima facie obvious for one of ordinary skill in the art to underfill the tank car to minimize the possibility of accidental spillage during transport.” (*see* Final Office Action p. 9, paragraph 5).

According to the instant application, the tank car is underfilled so that there would be a vapor space. This is pressurized by an inert gas such as nitrogen. This helps to keep oxygen gas out of the container and therefore prevents corrosion

(*see* Application, p. 12, 1<sup>st</sup> paragraph). Preventing spillage is not the primary reason for underfilling the container.

The Examiner states “Peterson ‘990 is applied to teach the desire of controlling the accidental release of HF, not to teach the use of sulfone as HF diluent.” (*see* Final Office Action, p. 10, 1<sup>st</sup> paragraph).

Applicants maintain that Peterson provides evidence of a long-felt need for the safe transportation of HF, which the instant application fulfills.

The Examiner states “it would have been obvious to one of ordinary skill in the art to not overfill the closed volume, thus creating a vapor space therein . . . in order to prevent accidental release of HF.” (*see* Final Office Action, p. 10, 3<sup>rd</sup> paragraph).

As stated above, a primary purpose of the vapor space is to prevent corrosion of the container.

Concerning the Peterson reference, Applicants maintain that it teaches away from using HF and is therefore not combinable with Wu.



In view of the arguments herein, claims 1-81 are believed to be in condition for allowance. Therefore, early allowance of claims 1-81 is respectfully requested.

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